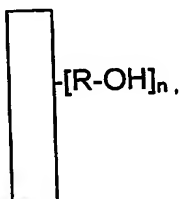


WHAT IS CLAIMED IS:

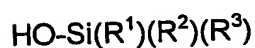
1. A method comprising the steps of:

a) providing hydroxyl-functionalized CNTs of the general formula:

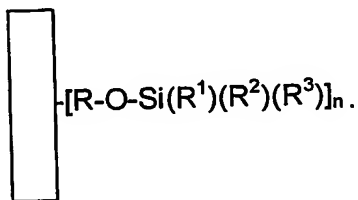


wherein R is an optional organic spacer; and

b) reacting the hydroxyl-functionalized CNTs with silanol species of the general formula:



wherein R^1 - R^3 are each selected from the group consisting of hydrogen, hydroxyl, thiol, saturated aliphatic hydrocarbons, unsaturated aliphatic hydrocarbons, cycloaliphatic hydrocarbons, aromatic hydrocarbons, amines, amides, esters, ethers, epoxies, silyl, germlyl, stannyl, and combinations thereof, to yield silane-functionalized CNTs of the general formula:



2. The method of claim 1, wherein the hydroxyl-functionalized CNTs are made by a method comprising the steps of:

a) fluorinating CNTs to yield fluoronanotubes; and

b) reacting the fluoronanotubes with a hydroxyl-containing species to yield hydroxyl-functionalized CNTs.

3. The method of claim 2, wherein the hydroxyl-containing species is an amino alcohol.

4. The method of claim 3 further comprising the addition of pyridine as a reaction catalyst.
5. The method of claim 2, wherein hydroxyl-containing species is an alcohol species with at least two hydroxyl groups attached to it.
6. The method of claim 5 further comprising a metal hydroxide species to facilitate reaction of the alcohol species with the fluoronanotubes.
7. The method of claim 6, wherein the metal hydroxide species is selected from the group consisting of LiOH, NaOH, KOH, and combinations thereof.
8. The method of claim 1, wherein the CNTs are selected from the group consisting of SWNTs, MWNTs, double-wall carbon nanotubes, and combinations thereof.
9. The method of claim 1, wherein the CNTs are SWNTs.
10. The method of claim 1, wherein the ratio of attached silane functional groups to carbon nanotube carbon atoms ranges from about 1:100 to about 1:5.
11. The method of claim 2, wherein the fluoronanotubes have a stoichiometry that ranges from about $C_1F_{0.01}$ to about C_2F .
12. The method of claim 1 further comprising the steps of:
 - a) mixing the silane-functionalized CNTs with polymer precursor to form a precursor mixture; and
 - b) polymerizing the polymer precursor in the mixture to form a CNT-polymer composite.

13. The method of claim 12, wherein the silane-functionalized CNTs become covalently linked to the polymer upon polymerization of the polymer precursor in the mixture.
14. The method of claim 12, wherein the CNT-polymer composite comprises from about 0.1 weight percent silane-functionalized CNTs to about 10 weight percent silane-functionalized CNTs.
15. The method of claim 12, wherein the polymer precursor is a thermoset selected from the group consisting of epoxy, vinyl ester, polyester, bismaleimide, and combinations thereof.
16. The method of claim 1 further comprising a step of blending the silane-functional CNTs with a thermoplastic polymer material to form a CNT-polymer blend.
17. The method of claim 16, wherein the thermoplastic polymer material is selected from the group consisting of polystyrene, polyethylene, polypropylene, and combinations thereof.
18. The method of claim 16, wherein the CNT-polymer blend comprises from about 0.1 weight percent silane-functionalized CNTs to about 10 weight percent silane-functionalized CNTs.
19. The method of claim 16, wherein the silane-functionalized CNTs in the CNT-polymer blend interact with the polymer matrix via a manner selected from the group consisting covalently, through hydrogen bonding, van der Waals forces, dipole-dipole interactions, and combinations thereof.
20. The method of claim 1 further comprising the steps of:
- a) contacting the silane-functionalized CNTs with polymer precursor via resin transfer molding; and
 - b) curing the polymer precursor after contact with the silane-functionalized CNTs to form CNT-polymer composites.

21. The method of claim 20, wherein the resin transfer molding is vacuum assisted.
22. The method of claim 20 further comprising the addition of reinforcing fibrous material selected from the group consisting of glass fibers, carbon fibers, vapor-grown carbon fibers, KEVLAR fibers, and combinations thereof, prior to the step of curing.
23. A silane-functionalized CNT comprising:
- a) a CNT backbone; and
 - b) silane species, having the general formula:
 $-\text{Si}-(\text{R}^1)(\text{R}^2)(\text{R}^3)$, wherein R^1 - R^3 are each selected from the group consisting of hydrogen, hydroxyl, thiol, saturated aliphatic hydrocarbons, unsaturated aliphatic hydrocarbons, cycloaliphatic hydrocarbons, aromatic hydrocarbons, amines, amides, esters, ethers, epoxies, silyl, germyl, stannyl, and combinations thereof, and wherein the silane species is attached to the CNT backbone through chemical bonds.
24. The silane-functionalized CNT of claim 23, wherein the CNT is selected from the group consisting of SWNTs, MWNTs, double-wall carbon nanotubes, and combinations thereof.
25. The silane-functionalized CNT of claim 23, wherein the silane species is covalently attached to the CNT backbone through a linker species selected from the group consisting of hydroxyl, amino, chloro, and combinations thereof.
26. The silane-functionalized CNT of claim 23; wherein at least some of the silane species are attached to the CNT sidewall.
27. The silane-functionalized CNT of claim 23, wherein the ratio of attached silane functional groups to carbon nanotube carbon atoms ranges from about 0.01:1 to about 0.2:1.

28. The silane-functionalized CNT of claim 23, wherein at least one of R^1 - R^3 is capable of interaction with polymer material.
29. A CNT-polymer composite comprising:
- a) silane-functionalized CNTs; and
 - b) a polymer host material, wherein the silane functionalized CNTs possess functionality capable of interacting with the polymer host material.
30. The CNT-polymer composite of claim 29, wherein the silane-functionalized CNTs comprise CNTs selected from the group consisting of SWNTs, MWNTs, double-wall carbon nanotubes, and combinations thereof.
31. The CNT-polymer composite of claim 29, wherein the polymer host material is selected from the group consisting of epoxy, vinyl ester, polyester, bismaleimide, and combinations thereof.
32. The CNT-polymer composite of claim 29, wherein the polymer host material is a thermoset.
33. The CNT-polymer composite of claim 29, wherein the polymer host material is a thermoplastic.
34. The CNT-polymer composite of claim 29, wherein the silane-functionalized CNTs covalently interact with the polymer host material.
35. The CNT-polymer composite of claim 29, wherein the silane-functionalized CNTs interact with the polymer host material via a mechanism selected from the group consisting of covalent bonding, hydrogen bonding, van der Waals forces, dipole-dipole interactions, and combinations thereof.
36. The CNT-polymer composite of claim 29, wherein the silane-functionalized CNTs are homogeneously dispersed throughout the polymer matrix.

37. The CNT-polymer composite of claim 29, wherein the silane-functionalized CNTs are present in the composite in an amount that ranges from about 0.1 weight percent to about 10 weight percent.
38. The CNT-polymer composite of claim 29, wherein the silane-functionalized CNTs are largely de-bundled.
39. The CNT-polymer composite of claim 29, wherein the composite has at least one property enhancement over the polymer host material in its native state, wherein the property enhancement is selected from the group consisting of mechanical, electrical, thermal, and optical.
40. The CNT-polymer composite of claim 29, wherein the composite is multifunctional.
41. A composite material comprising:
- a) CNTs;
 - b) a quantity of fiber reinforcement material; and
 - c) polymer, wherein the CNTs serve as a bridge, chemically binding the fiber reinforcement material with the polymer.
42. The composite material of claim 41, wherein the CNTs are silane-functionalized.
43. The composite material of claim 41, wherein the CNTs are SWNTs.
44. The composite material of claim 41, wherein the fiber reinforcement material is silane-functionalized.
45. The composite material of claim 41, wherein the fiber reinforcement material is glass fibers.

46. The composite material of claim 45, wherein the glass fibers have been resized.
47. The composite material of claim 41, wherein the polymer material is epoxy.
48. The composite material of claim 45, wherein the glass fibers are present in the form of woven sheets.
49. The composite material of claim 48, wherein such woven sheets are stacked together with silane-functionalized CNTs and polymer between them.
50. A method comprising the steps of:
- a) providing a quantity of fiber reinforcement material;
 - b) adding CNTs to the fiber reinforcement material to form CNT-coated fibers;
 - c) contacting polymer material with the CNT-coated fibers to form composite material comprising CNTs, a fiber reinforcement material, and polymer material.
51. The method of claim 50, wherein the quantity of fiber reinforcement material comprises glass fiber.
52. The method of claim 50, wherein the CNTs are selected from the group consisting of SWNTs, MWNTs, double-wall carbon nanotubes, and combinations thereof.
53. The method of claim 50, wherein the CNTs are SWNTs.
54. The method of claim 50, wherein the CNTs are silane-functionalized.
55. The method of claim 51, wherein the glass fiber is resized with organosilane species.

56. The method of claim 50, wherein the step of adding CNTs to the fiber reinforcement material to form CNT-coated fibers comprises an incipient wetting process, said process comprising the steps of:

- a) dispersing CNTs and fiber reinforcement material in a solvent to form a mixture; and
- b) removing said solvent to leave the fibers coated with CNTs.

57. The method of claim 56, wherein the CNTs are functionalized.

58. The method of claim 50, wherein the CNTs are chemically bound to the fiber reinforcement material through functional groups originating on either of the CNTs and fiber reinforcement material.

59. The method of claim 50, wherein the CNTs are chemically bound to the fiber reinforcement material through functional groups originating on both the CNTs and fiber reinforcement material.

60. The method of claim 50, wherein the polymer material is selected from the group consisting of thermosets, thermoplastics, and combinations thereof.

61. The method of claim 50, wherein the polymer material is selected from the group consisting of epoxies, vinylesters, polyester, bismaleimide, polystyrene, polybutadiene or polyisoprene and combinations thereof.

62. The method of claim 50, wherein the polymer material comprises at least one polymer precursor.

63. The method of claim 62 further comprising a step of polymerizing the at least one polymer precursor.

64. The method of claim 62 further comprising a step of curing the at least one polymer precursor.

65. The method of claim 50, wherein the fiber reinforcement material is sized with the CNTs.

66. The method of either of claims 58 or 59, wherein either of the CNTs and the fiber reinforcing material are chemically bound to the polymer material.

67. The method of either of claims 58 or 59, wherein both the CNTs and the fiber reinforcing material are chemically bound to the polymer material.